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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

In the Matter of

Amendment of Parts 5, 21, 22, 23, 25,
73, 74, 78, 80, 87, 90, 94, 95 and 97
of the Rules to Establish a Radio
Astronomy Communications Zone in
Puerto Rico

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)
) RM-8165
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TO: The Chief, Policy and Rules Division

COMMENTS OF THE SOCIETY OF BROADCAST ENGINEERS, INC.

THE SOCIETY OF BROADCAST ENGINEERS, INC.

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February 18, 1993

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SUMMARY

The Society of Broadcast Engineers, Inc. (SBE) submits its comments in response to the Petition for Rule Making filed by Cornell University seeking to establish a radio astronomy notification zone throughout the Commonwealth of Puerto Rico, in an effort to protect the Arecibo Observatory, operated by Cornell, from radio interference.

SBE agrees that the Arecibo facility should be protected against actual interference, and broadcast engineers are willing to assist cooperatively in the resolution of any interference. As certain broadcast facilities may cause interference to the operations of the Observatory as the result of harmonic emissions within radio astronomy spectrum allocations, there is a need for some notification process. It is unclear from the petition, however, what the level of protection should be; what the criteria are for determining what might trigger a petition to deny a particular application after notification, and what the obligation of the Observatory should be after notification to attempt to resolve interference concerns informally, rather than through Commission intervention. It is further unclear what criteria the Commission should use to resolve a claim of interference to the Observatory.

Though Cornell claims a lack of terrain shielding between cities in Puerto Rico to the Observatory, terrain profiles belie the claim. There is no justification for a notification zone comprising the entire island of Puerto Rico, nor is there any indication that certain facilities create any interference potential. Certain short-term broadcast operation, if subjected to the 20-day prior notification procedure, could be precluded entirely, and should not be so restricted.

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TO: The Chief, Policy and Rules Division

COMMENTS OF THE SOCIETY OF BROADCAST ENGINEERS, INC.

The Society of Broadcast Engineers, Incorporated ("SBE"), the national association of broadcast engineers and technical communications professionals, on behalf of its more than 6,000 members in the United States and Puerto Rico, hereby respectfully submits its comments in response to the Petition for Rule Making filed on November 30, 1992, by Cornell University ("Cornell"), to establish a radio astronomy notification zone in Puerto Rico. The Petition was placed on public notice January 19, 1993 by Report No. 1925. These comments are thus timely filed. For its comments, SBE states as follows:

**I. The Arecibo Observatory Should Be Protected
Against Actual Interference**

1. SBE agrees with the basic premise of the Cornell Petition for Rule Making, that the Arecibo Observatory needs some form of protection against interference to its radio/radar telescope,

located in a valley 14.7 kilometers south of Arecibo, Puerto Rico.¹ However, some aspects of the proposed notification process, and the delineation of the notification zone, would be unreasonably and unnecessarily burdensome to broadcasters. Several modifications to the protocol proposed by Cornell are in order.

II. Arecibo Observatory Does Have Extensive Terrain Shielding

2. SBE is constrained to note that the claim at page 2 of the Cornell Petition, that the Arecibo Observatory ". . .enjoys very little natural shielding from radiation sources over a large fraction of the island", is simply incorrect. Puerto Rico has extremely rugged terrain and extensive terrain shielding. Indeed, it is because of such extensive terrain shielding that one television station in Puerto Rico has been able to building and successfully operate a system of four TV Channel 7 transmitters without causing mutual self-interference.²

3. To demonstrate the extent of the natural terrain shielding from the Arecibo Observatory, representative terrain profiles have been prepared to four cities, Fajardo, Guayama, Mayaguez, and

¹ The geographical coordinates given in the Cornell Petition for the Arecibo Observatory are North Latitude 18° 20' 46", West Longitude 66° 45' 11". The Petition did not specify whether these are NAD27 coordinates or NAD83 coordinates; NAD27 coordinates have been assumed.

² TV Station WSTE, Channel 7, Ponce, Puerto Rico, now operates four separate Channel 7 transmitters from sites referred to as the South Site, the North Site, the West Site, and the Arecibo Site. Each site uses a circularly polarized directional antenna, natural terrain shielding provided by the transmitter sitting at low elevations in front of mountain peaks, and precise frequency offsets.

Ponce, and are attached to these comments as Figures 1 through 4. These profiles make it clear that the Cornell claim of "very little natural shielding" is grossly incorrect. This points up a rather significant characteristic of the entire petition, which is that the interference concerns are distinctly unquantified, and as such it is impossible to determine the actual interference potential from other communications facilities. For this reason, the petition does not justify the relief requested, and further engineering data should be submitted by the petitioner before any Commission action is taken on the petition toward any Notice of Proposed Rule Making.

III. Creation of a Notification Zone And Specification of Technical Interference Criteria

4. Though the petition has not justified the geographic parameters of the proposed notification zone, and though there is, as noted above, significant terrain shielding to large portions of Puerto Rico, there may be, with respect to certain communications licensees such as broadcasters, practical reasons for designating the entire island of Puerto Rico as a notification zone, if for no other reason than to eliminate concerns over who must provide advance notification to Cornell and who need not do so. Assuming that the notification procedure is benign, and does not create any presumption of entitlement in interference resolution, SBE does not necessarily object to the Cornell proposal to make the entire island of Puerto Rico, comprising some 8,958 square kilometers, a notification zone. A mere requirement that a broadcaster notify the Arecibo Observatory of technical details of applications requiring Commission approval that might potentially impact the

observatory's operations is not, on its face, unreasonably burdensome. Most applications requiring Commission approval under Rule Parts 73 and 74 require more processing time than the 20-day notification period anyway.

5. The Cornell Petition does not propose to grant the Arecibo Observatory any preference in interference resolution, nor does it constitute a de facto reallocation of spectrum, in favor of radioastronomy. Rather, it is simply intended to ensure that Cornell is made aware of any potentially troublesome operations in a timely manner. If Cornell feels that a particular broadcast application would, because of harmonic interference in radioastronomy frequency allocations, have a high potential of causing interference to the Arecibo Observatory, it could then contact the applicant and attempt to resolve the threat. If this initial contact does not allay Cornell's concern, then it would have the procedural right to file a Petition to Deny or an Informal Objection within 20 days of the application being filed with the Commission. This process is not unreasonable on its face relative to the broadcast service. However, SBE has certain concerns which are not addressed in the petition. Cornell wants to be notified of any broadcast application which might be filed with the Commission. The benefit of that advance notification, however, should be accompanied by a firm obligation on the part of Cornell (which obligation should be codified) to attempt in good faith to informally address any anticipated interference concerns with the applicant prior to filing any opposition with the Commission.

Resolution of petitions to deny or informal objections is very expensive to the broadcast applicant, and to the Commission in terms of its staff time. The delay in implementing station upgrades and modifications can result in losses of many thousands of dollars to the broadcaster in delayed initiation of new or upgraded service. And the burden of going forward, and of proving that a significant interference problem will result from the proposed broadcast application, should be squarely placed on Cornell.

6. That there are no technical criteria stated in the petition for determining in advance when an opposition to a particular broadcast application will be lodged by Cornell with the Commission is bothersome. While it is understandable that, for example, a line-of-sight, 1.5 MW UHF television station with a second harmonic in the radioastronomy frequency allocation would be of concern to the Observatory, it is completely unclear what technical criteria Cornell intends to apply. Absent that, the petition is incomplete and premature. Neither is it clear who should bear the financial burden of interference resolution, when the broadcast applicant proposes a facility in accordance with all Commission technical rules, but to which Cornell objects (on whatever basis). SBE wishes to establish, for example, that the cost of installing additional filtering to attenuate the harmonics of a broadcast or broadcast auxiliary station that Cornell might deem a threat to the Observatory's mission is to be born by Cornell. In other words, SBE wishes to clarify that Cornell should have no grounds for objecting to a broadcast or broadcast auxiliary application on the

basis of potential harmonic radiation if harmonic radiation, suppressed to the degree specified in the FCC Rules for the class of broadcast station in question, nevertheless calculates to be in excess of the Arecibo Observatory's receiver sensitivity where the harmonic of interest could occur.

7. SBE would, however, have no objection to the Commission's placing a condition on a construction permit requiring installation of filters to achieve reasonable additional suppression beyond that normally required by the FCC Rules that might be needed, so long as Cornell pays for the purchase, installation, and adjustment costs of such filters.

IV. Prior Notification and Approval of Short-Term Operation Is Unnecessarily Burdensome

8. The Cornell Petition proposes that any broadcaster operating under Section 74.24 of the FCC Rules ("Short-Term Operation") first be required to notify Cornell in advance, and obtain Cornell's approval, before commencing Short-term Operation of a temporary broadcast auxiliary station. SBE objects to this proposal, as it would, in effect, preclude Short-term Operation (including certain real-time electronic news gathering), for the entire island of Puerto Rico. This is clearly unreasonable. A 10-watt, 450 Mhz temporary remote pickup (RPU) station at, for example, Cabo Rojo in the southwest corner of Puerto Rico could not possibly impact the Arecibo Observatory. Yet, under the Cornell Petition, such Short-term Operation would require Cornell's blessing. In effect, Cornell seeks veto power over all Short-term Operation for all of Puerto Rico.

9. Section 74.24(g) of the Commission's rules encourages broadcasters needing to operate with temporary facilities to first coordinate such Short-term Operation with the appropriate frequency coordinating committee, but recognizes that such prior coordination is not always practicable by stating ". . .this notification provision shall not apply where an unanticipated need for immediate short-term mobile station operation would render compliance with the provisions of this paragraph impractical." If the Cornell Petition limited its proposed Short-term Operation preclusion to the 4-mile (6.4 kilometer) radius Commonwealth of Puerto Rico Protection Zone, comprising 130 square kilometers, or approximately 1.5% of Puerto Rico's land area, SBE would have no objection to such a restriction on this small portion of Puerto Rico. But to preclude Short-term Operation for all of Puerto Rico is simply unreasonable and unnecessary. Such preclusion would eliminate an area almost 1,000 times larger than the area now precluded to Short-term Operation by the Table Mountain Radio Receiving Zone near Boulder, Colorado!³

10. SBE suggests that Short-term Operation in Puerto Rico should continue to be permitted without additional restriction. Outside the 4-mile Commonwealth of Puerto Rico Protection Zone, notification should not have to be given in advance, and permission

³ The Table Mountain Radio Receiving Zone is defined as a rectangular area bounded on the east by West Longitude 105° 13' 31", bounded on the west by West Longitude 105° 15' 31", bounded on the north by North Latitude 40° 09' 10", and bounded on the south by North Latitude 40° 07' 50". This zone has an area of approximately 9.4 square kilometers.

from the Observatory should not be required. At most, after-the-fact notification to the Observatory should be acceptable. This would eliminate the most likely threat to Short-term Operation in Puerto Rico under the Cornell proposal: where the Observatory receives notification of Short-term Operation from, for example, a low-powered broadcast auxiliary station on the other side of the island. There is no question that such operation poses no threat to the Observatory.

11. SBE also proposes that if broadcasters are to be required to inform the Arecibo Observatory of intended Short-term Operation anywhere on the island of Puerto Rico, the Observatory should be required to maintain a 24-hour "hot line" telephone number to receive such notifications. Further, this hot line number should be an "800", toll-free number. In the event that any Short-term Operation inside the Commonwealth of Puerto Rico Protection Zone does, in fact, interfere with any of the Observatory's operations, then the Short-term Operation would have to be suspended pursuant to Section 74.24(c) of the FCC Rules. Thus, SBE is not proposing that Short-term Operation be done without regard to any effect on the Arecibo Observatory. Rather, SBE is only proposing that prior approval by the Observatory not be required for Short-term Operation outside of the 4-mile protection zone.

V. Exempt 18 and 23 GHz Stations

12. The Cornell Petition explains that expanded operations at the Arecibo Observatory will include frequencies up to 12.2 GHz, after completion of its Gregorian Upgrade program, involving

installation of a Gregorian subreflector system. SBE therefore sees no need to include 18 GHz STL and ICR broadcast auxiliary microwave stations, or 23 GHz Private Operational Fixed Service (POFX) stations⁴ in the proposed notification requirement. These stations typically utilize transmitter powers of only 0.1 to 1 watt and highly directional antennas. Since the fundamental frequency of these stations is well above the highest frequency the Arecibo Observatory would use even after its Gregorian Upgrade program, there is no harmonic radiation threat to the Observatory from these stations.

VI. Summary

SBE does not object to the basic intent of the Cornell Petition, which is to ensure that the Arecibo Observatory learns in a timely manner of applications that might potentially affect the Observatory's mission, so that the Observatory is afforded the opportunity to comment on such applications before they are granted. However, SBE does object to the vague procedure proposed for evaluating broadcast applications; the absence of any informal dispute resolution obligation on Cornell; the absence of any proposal for allocation of costs; and the proposed loss of Short-term broadcast operation for the entire island of Puerto Rico. As to the last, such preclusion is neither necessary or reasonable.

⁴ 23 GHz POFS stations are sometimes used by broadcasters when lower frequency broadcast auxiliary channels in the 950 MHz, 2, 7, and 13 GHz bands are difficult to establish due to frequency congestion.

A less restrictive 4-mile "prior permission" preclusion zone for Short-term Operations would be adequate to protect the Observatory's interests. The shortcomings of the petition with respect to technical evaluation criteria renders the petition incomplete, and it is suggested that the petitioner be required to provide further information before any further rule making is undertaken premised on the instant petition.

LIST OF FIGURES

The following figures or exhibits have been prepared as a part of these RM-8165 comments:

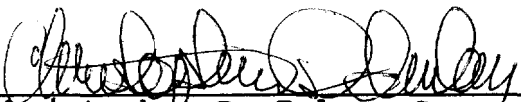
1. Terrain profile from the Arecibo Observatory to Fajardo, Puerto Rico.
2. Terrain profile from the Arecibo Observatory to Guayama, Puerto Rico.
3. Terrain profile from the Arecibo Observatory to Mayaguez, Puerto Rico.
4. Terrain profile from the Arecibo Observatory to Ponce, Puerto Rico.

Respectfully submitted,

SOCIETY OF BROADCAST ENGINEERS, INC.

By Richard Farquhar
Richard Farquhar, President

By Dane E. Ericksen
Dane E. Ericksen, P.E.
Chairman, SBE FCC Liaison
Committee

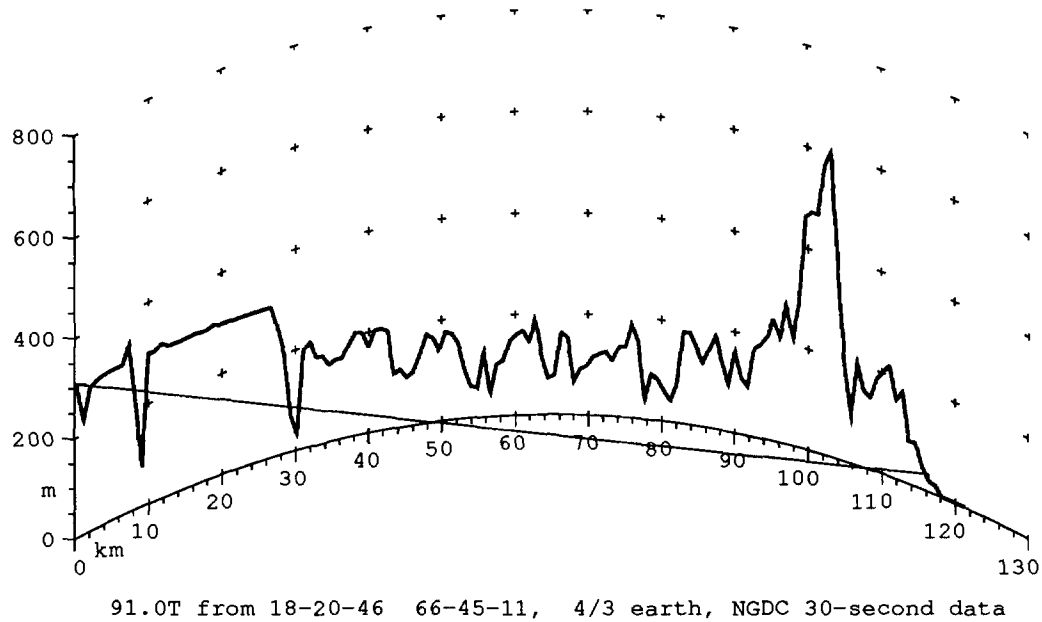
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February 18, 1993

**ARECIBO OBSERVATORY NOTIFICATION ZONE COMMENTS
RM-8165**

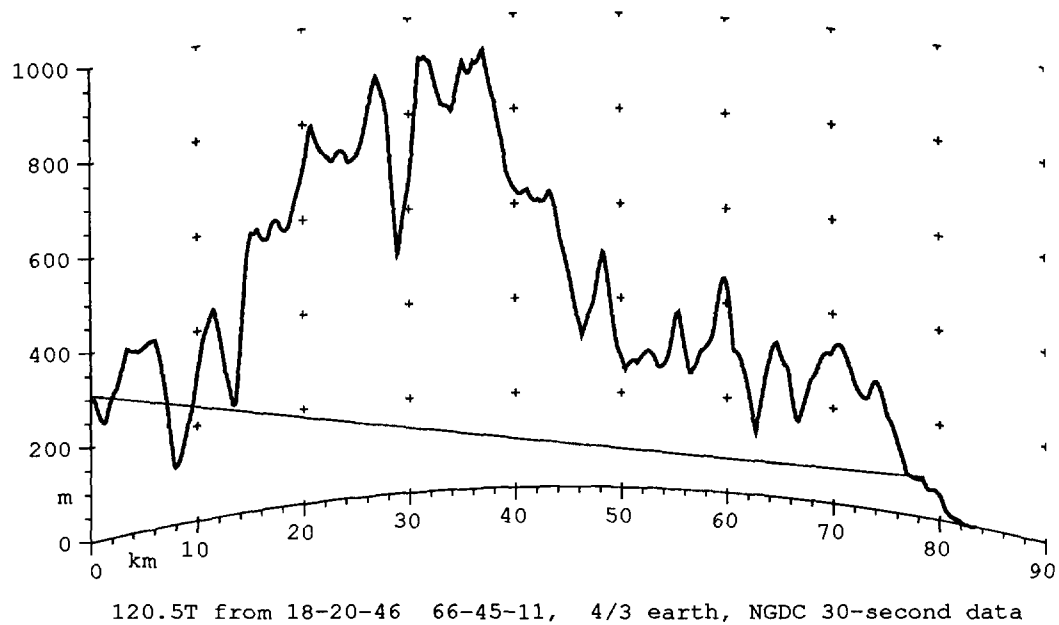
ARECIBO OBSERVATORY TO FAJARDO TERRAIN PROFILE



Terrain profile from Arecibo Observatory to Fajardo, Puerto Rico. Profile extends 5 kilometers beyond the U.S. Atlas reference coordinates for Fajardo.

**ARECIBO OBSERVATORY NOTIFICATION ZONE COMMENTS
RM-8165**

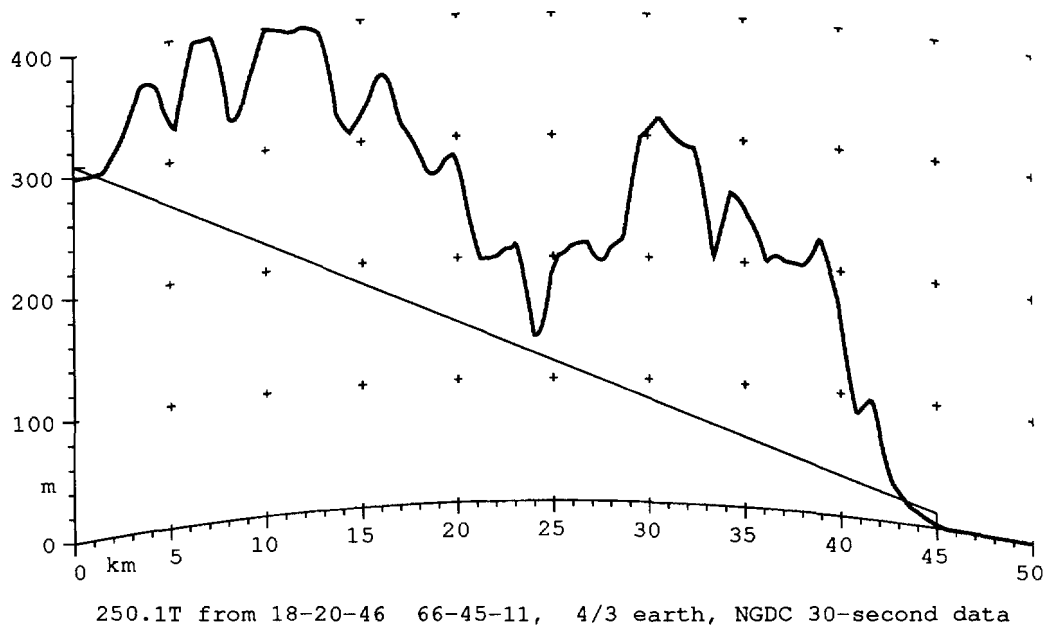
ARECIBO OBSERVATORY TO GUAYAMA TERRAIN PROFILE



Terrain profile from Arecibo Observatory to Guayama, Puerto Rico. Profile extends 5 kilometers beyond the U.S. Atlas reference coordinates for Guayama.

ARECIBO OBSERVATORY NOTIFICATION ZONE COMMENTS
RM-8165

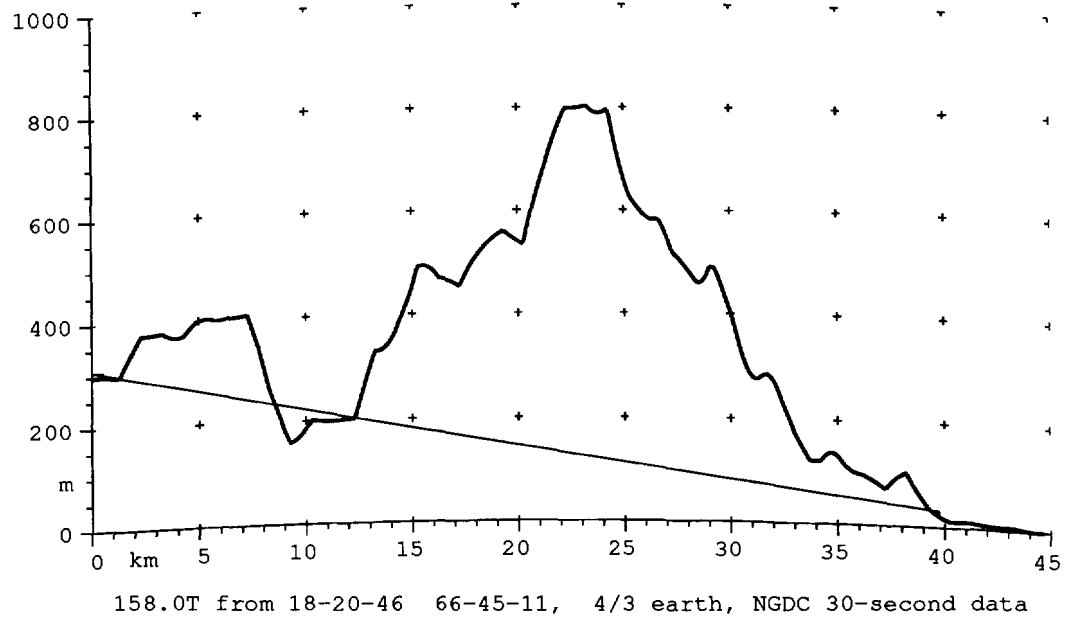
ARECIBO OBSERVATORY TO MAYAGUEZ TERRAIN PROFILE



Terrain profile from Arecibo Observatory to Mayaguez, Puerto Rico. Profile extends 5 kilometers beyond the U.S. Atlas reference coordinates for Mayaguez.

ARECIBO OBSERVATORY NOTIFICATION ZONE COMMENTS
RM-8165

ARECIBO OBSERVATORY TO PONCE TERRAIN PROFILE

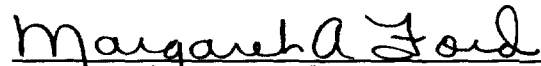


Terrain profile from Arecibo Observatory to Ponce, Puerto Rico. Profile extends 5 kilometers beyond the U.S. Atlas reference coordinates for Ponce.

CERTIFICATE OF SERVICE

I, Margaret A. Ford, Office Manager of the law firm of Booth, Freret & Imlay, do certify that copies of the foregoing COMMENTS OF THE SOCIETY OF BROADCAST ENGINEERS, INC. were mailed via U. S. Mail, postage prepaid, first class, this 18th day of February 1993, to the offices of the following:

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Prince Frederick, MD 20678
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Margaret A. Ford